DO NOT WRITE ON THIS EXAM

MATH 110 - College Algebra

EXAM 4   December 5-11, 2018

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Instructions:

- Calculators and notes are not allowed.
- Do not write on this exam.
- Mark the correct answer on the bubble sheet provided.
- There is only one correct answer for each multiple choice question.
- There is no time limit.
- Please do not talk about the test with other students until after December 13.

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(1) Find the equation of the ellipse with vertices: (2,7) and (2,1) and one of the foci at (2,6)

(a) $\dfrac{(x-2)^2}{5} + \dfrac{(y-4)^2}{9} = 1$

(b) $\dfrac{(x-2)^2}{9} + \dfrac{(y-4)^2}{5} = 1$

(c) $\dfrac{(x-4)^2}{9} + \dfrac{(y-2)^2}{5} = 1$

(d) $\dfrac{(x-4)^2}{5} + \dfrac{(y-2)^2}{9} = 1$

(e) $\dfrac{(x-1)^2}{2} + \dfrac{(y-4)^2}{9} = 1$

(f) $\dfrac{(x-5)^2}{2} + \dfrac{(y-9)^2}{4} = 1$

(2) What is the center of the following ellipse: $2x^2 + 4x + 3y^2 - 18y + 12 = 0$?

(a) $(1, 3)$

(b) $(3, 1)$

(c) $(-3, -1)$

(d) $(-1, -3)$

(e) $(-1, 3)$

(f) $(-3, 1)$

(3) What type of conic section is the following equation: $5x^2 + 10x - 7y^2 + 42y + 17 = 0$

    (a) Circle

    (b) Hyperbola

    (c) Ellipse

    (d) Parabola

    (e) It is not a conic

(4) What are the oblique asymtotes of the following hyperbola $\dfrac{y^2}{16} - \dfrac{x^2}{4} = 1$?

    (a) $y = \pm 2x$

    (b) $y = \pm\frac{1}{2}x$

    (c) $y = \pm 4x$

    (d) $y = \pm\frac{1}{4}x$

    (e) $y = \pm 16x$

    (f) $y = \pm\frac{1}{16}x$

(5) How many solutions does the following system have: $\begin{cases} 3x + 5y = 10 \\ -6x - 10y = 3 \end{cases}$?

    (a) None

    (b) 1

    (c) 2

    (d) 3

    (e) 4

    (f) ∞

(6) Solve the following system for z: $\begin{cases} 3x + 3y + 2z = 4 \\ x - y - z = 0 \\ 2y - 3z = -8 \end{cases}$

    (a) -1
    (b) 0
    (c) 1
    (d) 2
    (e) 3
    (f) 4

(7) How many solutions does the following system have: $\begin{cases} x^2 + y^2 = 9 \\ x^2 + y = 7 \end{cases}$?

    (a) 0
    (b) 1
    (c) 2
    (d) 3
    (e) 4
    (f) ∞

(8) Solve the following system of equations: $\begin{cases} \dfrac{1}{x} + \dfrac{1}{y} = 8 \\ \dfrac{3}{x} - \dfrac{5}{y} = 0 \end{cases}$. What is $x + y$?

    (a) $\dfrac{8}{3}$

    (b) $\dfrac{8}{5}$

    (c) $\dfrac{8}{15}$

    (d) $\dfrac{2}{3}$

    (e) $\dfrac{2}{5}$

    (f) $\dfrac{2}{15}$

(9) Which of the following is a correct form for a Partial Fraction Decomposition of

$$\frac{x^3 - 5x}{(x^2 + 2x - 3)(x^2 + 1)^2}?$$

(a) $\dfrac{A}{x+3} + \dfrac{B}{x-1} + \dfrac{Cx+D}{x^2+1}$

(b) $\dfrac{A}{x+3} + \dfrac{B}{x-1} + \dfrac{Cx+D}{x^2+1} + \dfrac{Ex+F}{(x^2+1)^2}$

(c) $\dfrac{A}{x+3} + \dfrac{B}{x-1} + \dfrac{Cx+D}{(x^2+1)^2}$

(d) $\dfrac{A}{x+3} + \dfrac{B}{x-1} + \dfrac{C}{x^2+1} + \dfrac{Dx+E}{(x^2+1)^2}$

(e) $\dfrac{A}{x+3} + \dfrac{B}{x-1} + \dfrac{C}{x^2+1} + \dfrac{D}{(x^2+1)^2}$

(f) $\dfrac{Ax+B}{x+3} + \dfrac{Cx+D}{x-1} + \dfrac{Ex+F}{x^2+1} + \dfrac{Gx+H}{(x^2+1)^2}$

(10) If $\dfrac{A}{x} + \dfrac{Bx+C}{x^2+4}$ is a correct form for a Partial Fraction Decomposition of $\dfrac{1}{x(x^2+4)}$, what are A, B and C?

(a) $A = \dfrac{1}{4}$, $B = -\dfrac{1}{4}$, $C = 0$

(b) $A = \dfrac{1}{3}$, $B = -\dfrac{1}{3}$, $C = 1$

(c) $A = \dfrac{1}{2}$, $B = -\dfrac{1}{2}$, $C = -1$

(d) $A = -\dfrac{1}{4}$, $B = \dfrac{1}{4}$, $C = 1$

(e) $A = -\dfrac{1}{3}$, $B = \dfrac{1}{3}$, $C = 0$

(f) $A = -\dfrac{1}{2}$, $B = \dfrac{1}{2}$, $C = -1$

(11) If $n(A \cup B) = 20$, $n(A) = 10$, and $n(B) = 15$, what is $n(A \cap B)$?

(a) -15
(b) 15
(c) -10
(d) 10
(e) -5
(f) 5

(12) If $A = \{1, 3, 5, 7\}$, $B = \{2, 3, 4, 5\}$, and $C = \{2, 4, 6, 8\}$, what is $(A \cup B) \cap C$?

    (a) $\{1, 3, 5, 7\}$

    (b) $\{2, 3, 4, 5\}$

    (c) $\{2, 4, 6, 8\}$

    (d) $\{2, 4\}$

    (e) $\{2, 3, 4, 5, 6, 8\}$

    (f) Ø

(13) If $a_n = \left(\dfrac{3}{2}\right)^n$, what is a_4?

    (a) $\dfrac{27}{16}$

    (b) $\dfrac{81}{16}$

    (c) $\dfrac{81}{8}$

    (d) $\dfrac{27}{8}$

    (e) $\dfrac{3}{2}$

    (f) $\dfrac{243}{32}$

(14) Find the 101st term for the following sequence: $-1, 3, 7, 11, ...$?

    (a) 417

    (b) 413

    (c) 409

    (d) 407

    (e) 403

    (f) 399

(15) Find the following sum:

$$\sum_{k=1}^{20}(2k+7)$$

(a) 360

(b) 460

(c) 560

(d) 660

(e) 760

(f) 860

(16) Find the following sum:

$$\sum_{k=1}^{10}\left(\frac{3}{5}\right)^k$$

(a) $\dfrac{3}{2}\left(1-\left(\dfrac{3}{5}\right)^9\right)$

(b) $\dfrac{5}{3}\left(1-\left(\dfrac{3}{5}\right)^9\right)$

(c) $\dfrac{3}{5}\left(1-\left(\dfrac{3}{5}\right)^9\right)$

(d) $\dfrac{3}{2}\left(1-\left(\dfrac{3}{5}\right)^{10}\right)$

(e) $\dfrac{5}{3}\left(1-\left(\dfrac{3}{5}\right)^{10}\right)$

(f) $\dfrac{3}{5}\left(1-\left(\dfrac{3}{5}\right)^{10}\right)$

(17) Find the following infinite sum:

$$\sum_{k=1}^{\infty}\left(\frac{1}{2}\right)^k$$

(a) -1

(b) $-\dfrac{1}{2}$

(c) 0

(d) $\dfrac{1}{2}$

(e) 1

(f) $\dfrac{3}{2}$

(18) What is $\dfrac{13!}{11!2!}$?

    (a) 76

    (b) 77

    (c) 78

    (d) 79

    (e) 80

    (f) 81

(19) How many subsets of $\{2, 3, 5, 7\}$ are there?

    (a) 9

    (b) 27

    (c) 81

    (d) 8

    (e) 16

    (f) 32

(20) If $1 + 4 + 7 + 10 + ... + (3n - 2) = \dfrac{n(3n - 1)}{2}$ and we add $3(n + 1) - 2$ to the left side, what is the new value of the right side?

    (a) $\dfrac{(n + 4)(3n + 5)}{2}$

    (b) $\dfrac{(n + 3)(3n + 4)}{2}$

    (c) $\dfrac{(n + 2)(3n + 3)}{2}$

    (d) $\dfrac{(n + 1)(3n + 2)}{2}$

    (e) $\dfrac{n(3n + 1)}{2}$

    (f) $\dfrac{(n - 1)(3n)}{2}$

Answer Key

(1)	A	(6)	D	(11)	F	(16)	D
(2)	E	(7)	E	(12)	D	(17)	E
(3)	B	(8)	C	(13)	B	(18)	C
(4)	A	(9)	B	(14)	F	(19)	E
(5)	A	(10)	A	(15)	C	(20)	D